21923 PC

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DEVICE FOR ENABLING AN OBSERVER TO VERIFY THE ANGLE-DEPENDENT SCATTERING BEHAVIOR OF AN OBJECT

SUBSTITUTE SPECIFICATION

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a national stage of PCT/AT99/00297 filed 2 December 1999 and based upon Austrian national application A2038 filed 2 December 1998 and GM 808/99 filed 19 November 1999 under the International Convention.

FIELD OF THE INVENTION

The present invention relates to a device for visual verification of the angle-dependent scattering properties of an object by an observer, the device having a holder which is provided with a measuring window that can be brought into a predetermined position relative to the object as well as an observer window which allows viewing by the observer.

The invention relates further to an apparatus for the visual comparison of the angle-dependent scattering properties of a test object with a reference object by an observer as well as to an apparatus for the optical verification of flat objects.

33-36 adjacent it so that an object can be simply shifted between the region 33-36 back and forth. The regions 33-36 need not necessarily be located adjacent one another but can also partly or wholly overlap and as to that there are certain preferences which will be detailed subsequently.

Over the first region 33 a device 1 with a first light source (FIG. 1), not separately visible here, is supported by the housing 30 such that its measuring window is disposed above a first region 33 or coincides with it. The device 1 can be constructed as has previously been illustrated in connection with FIGS. 1-5 (also complete units according to FIGS. 3-5 are possible) and is thus not shown with the exception of its observation window 7. When the device 1 tests the transmission scattering properties, it is in part arranged below the emplacement surface 31, i.e. the emplacement surface 31 or the first region 33 extends into the device 1.

The housing 30 carries an infrared camera 37 which is trained on the second region 34 of the emplacement surface 31. The infrared camera 37 is a commercial black-white CCD camera which is provided with a blocking filter 38 for filtering out the possible light range.

The filter curve of the blocking filter 36 is illustrated in FIG. 7. FIG. 7 shows the relative light power transmission in percent, normalized with respect to air, i.e. 100% corresponding to the transmission through air, versus the wavelength in nm. It is apparent that in the visible light range

(380-760 nm), the transmission amounts to substantially 0% and in the infrared range sharply increases.

The output signal of the infrared camera 37 can be available at the output connector 39 of the housing 30 for connection to an external monitor (not shown). Alternatively, or additionally, the housing 30 carries in itself a small monitor 40 of the LCD type.

In the housing 30, a "second" light source 41 is arranged which is trained on the second region 34 and has a significant proportion of its radiation in infrared. (The "first" light source is such that it itself is arranged in the device 1.) Especially suitable are commercially available inexpensive glow filament lamps which have a large infrared proportion.

By means of the infrared camera 37 with the aid of ambient light or the light source 41, an infrared reflection image of an image in the region 34 can be produced and, for example, can be displayed on the monitor 40.

The emplacement surface 31 can be constructed so that it is light permeable in the second region 34, for example by the flush insertion of a glass pane as has been indicated at 42. Beneath the glass pane 34 a third light source 43 is arranged in the housing 30 and has a significant radiation component in the infrared range and again preferably is formed by a glow film lamp. When the third light source 43 is turned on, an infrared transmission image of the object in the region 34 can be produced by the infrared camera.

having their origins in flicker effects of the gas-discharge lamp, should the regions 34 and 35 overlap, can be avoided.

The fourth region 36 is formed on the emplacement surface 36 and is equipped with an inductive sensor. With the aid of this sensor, the presence and optionally also the arrangement of inks with magnetic or metallic particles can be detected. Signal lights 47 are turned on by the induction sensor of the region 36 to render the sensor results optically effective. The sensor measurements can also be displayed on the monitor 40 or also with the aid of an acoustic signal.

The testing evaluating devices associated with the regions 33-36 can remain continuously in operation after the apparatus has been turned on (independently of the condition that the light sources 41 and 43 are to operate only alternatively) or the individual devices can be set in operation sequentially (independently of the preference that the ultraviolet source 45 should remain continuously in operation). To simplify the operation as much as possible, a single button 48 can, for example, be used which will trigger these control functions and/or a rotary selection switch 49 may be amplified.

The aforedescribed devices and apparatuses can be used for all kinds of objects and reflections or transmission-scattering subjects and thus for example also for cinegrams, surface-lighted holograms and transmission-lighted holograms or the like. It is also possible to further evaluate images which appear in the observation window automatically or mechanically, for example by capturing an image with a photographic camera for